

WE CLAIM:

1. A vehicle seat assembly comprising:

a seat backrest;

a seat bottom;

a seat frame having a front member and a rear member, said seat frame operatively supporting said seat bottom and further having at least one backrest rotating mechanism supported at said rear member that is adapted to allow said seat backrest to move between an upright position and a folded position in which said seat backrest is folded down upon said seat bottom, said seat frame further having at least one first pair of linkage attachment points on said front member to allow said rear member of said seat frame to be rotatively lifted upward and forward and move said seat frame from a seating position to a tumbled position relative to said front member;

at least one tumble mechanism is operatively disposed between said front member of said seat frame and the vehicle floor, said tumble mechanism having a first and a second linkage arm, and a base plate fixedly mounted to the vehicle floor, said first and second linkage arms are operatively and pivotably mounted to said front member of said seat frame and pivotably mounted to said base plate;

said first and second linkage arms having two unequal length lever arms which work cooperatively to cause said front member of said seat assembly to move rearward in an arcuate path as said rear member is lifted.

2. A vehicle seat assembly as set forth in claim 1 wherein said first pair of linkage attachment points on said front member are non-coaxial and one of said first pair of linkage attachment points is disposed higher relative to the vehicle floor than the other.

3. A vehicle seat assembly as set forth in claim 1 wherein said base plate further includes a second pair of linkage attachment points for said first and said second linkage arms wherein said second pair of linkage attachment points are non-coaxial and one of said second pair of linkage attachment points is disposed higher relative to the vehicle floor than the other.

4. A vehicle seat assembly as set forth in claim 1 further including two of said tumble assemblies disposed proximate to each end of said front member and a torsion tube assembly disposed in parallel relationship to said front member between said two tumble mechanisms such that the ends of said torsion tube assembly are operatively fixed to said first linkage arms of said two tumble mechanisms thereby operatively joining said first linkage arms together to cause both said tumble mechanisms to pivot in unison when said seat assembly is lifted.

5. A vehicle seat assembly as set forth in claim 4 wherein said torsion tube assembly further includes a tube body and a torsion rod, said tube body having a distal and a proximate end and said torsion rod having a distal and a proximate end, said torsion rod disposed within said tube body and having said distal end fixedly mounted to said distal end of said tube body and having said proximate end fixedly mounted to said base plate, said torsion rod operatively twisted along its length relative to the tube body such that a torsional biasing force is imparted to the tube body to maintain a preloaded angular biasing force on said linkage arms to assist in the rotational movement of the tumble mechanism.

6. A vehicle seat assembly as set forth in claim 1 wherein said tumble mechanism

further includes a locking arm supported upon said base plate and operable to move between a lock position and a release position such that said locking arm operatively engages said first linkage arm when said rear member of said seat frame is rotatively lifted upward and forward to move said seat frame from said seating position to said tumbled position and to hold said seat assembly in said tumbled position.

7. A vehicle seat assembly as set forth in claim 6 wherein said tumble mechanism further includes a biasing member and a release member, said biasing member operable to hold said locking arm in said lock position and said release member operable to selectively move said lock member to said release position thereby unlocking said seat assembly and allowing it to be moved to said seating position from said tumbled position.

8. A vehicle seat assembly as set forth in claim 1 wherein said seat assembly further includes at least one floor striker assembly having a ball latch assembly and a floor striker bracket, said ball latch assembly operatively disposed on said rear member, said floor striker bracket fixedly mounted to the vehicle floor beneath said ball latch assembly such that when said seat assembly is in the seating position said ball latch assembly engages said floor striker bracket and holds said seat assembly to the vehicle floor.

9. A vehicle seat assembly as set forth in claim 8 wherein said ball latch assembly further includes at least one ball latch having a locating pin and at least one captured and spring biased ball that protrudes laterally from the side of said locating pin to engage a latch opening in said striker bracket, such that when said locating pin is set into said latch opening said ball is depressed as

it passes through said latch opening and then re-extends to hold the seat assembly to said floor striker bracket.

10. A vehicle seat assembly as set forth in claim 9 wherein said seat assembly further includes a pair of said floor striker assemblies each operatively mounted on the underside of the ends of the rear member and joined by a release bar, said release bar operable to simultaneously release both said ball latches from said floor striker brackets.

11. A vehicle seat assembly as set forth in claim 1 wherein said at least one backrest rotating mechanism includes a locking mechanism having a release lever and a locking pin that engages a lock opening to operatively lock said backrest in the upright seating position supported at said rear member and is further adapted to selectively release said seat backrest to allow it to be moved to a folded position.

12. A vehicle seat assembly as set forth in claim 11 wherein said locking mechanism further includes a second lock opening such that said seat backrest may also be locked in the folded position by said release lever.

13. A vehicle seat tumble mechanism comprising:
a seat frame having a front member, a rear member, two side members, said front and said rear member disposed in a spaced parallel relationship with said side members disposed in a spaced parallel relationship therebetween, said front member further having at least one first pair of linkage attachment points to allow said rear member of said seat frame to be rotatively lifted upward about

said front member to move said seat frame from a generally horizontal position to a generally vertical position relative to said front member;

a first and a second linkage arm, and a base plate, said base plate fixedly mounted to the floor of a vehicle, said first and second linkage arms operatively and pivotably mounted to said front member of said seat frame and pivotably mounted to said base plate, said first and second linkage arms having two unequal length lever arms that work cooperatively to cause said front member of said seat assembly to move rearward in said vehicle in an arcuate path as said rear member is lifted.

14. A vehicle seat tumble mechanism as set forth in claim 13 further including a torsion tube assembly and two said base plates, each said base plate having a pair of first and second linkage arms, said base plates disposed proximate to each end of said front member such that the ends of said torsion tube assembly are operatively fixed to said first linkage arms thereby operatively joining said first linkage arms together to cause both to pivot in unison when said seat tumble mechanism is lifted.

15. A vehicle seat tumble mechanism as set forth in claim 14 wherein said torsion tube assembly further includes a tube body and a torsion rod, said tube body having a distal and a proximate end and said torsion rod having a distal and a proximate end, said torsion rod disposed within said tube body and having said distal end fixedly mounted to said distal end of said tube body and having said proximate end fixedly mounted to said base plate, said torsion rod operatively twisted along its length in a relative to the tube body such that a torsional biasing force is imparted to the tube body to maintain a preloaded angular biasing force on said linkage arms to assist in the rotational movement of the tumble mechanism.

16. A vehicle seat tumble mechanism assembly as set forth in claim 13 further including a locking arm supported upon said base plate and operable to move between a lock position and a release position such that said locking arm operatively engages said first linkage arm when said rear member of said seat frame is rotatively lifted upward and forward to move said seat frame from said generally horizontal position to said generally vertical position and to hold said seat tumble mechanism in place.

17. A vehicle seat tumble mechanism as set forth in claim 16 further including a biasing member and a release member, said biasing member operable to hold said locking arm in said lock position and said release member operable to selectively move said lock member to said release position thereby unlocking said seat tumble mechanism and allowing it to be moved to said generally horizontal position from said generally vertical position.

18. A vehicle seat assembly as set forth in claim 13 wherein said seat tumble mechanism further includes at least one floor striker assembly having a ball latch assembly and a floor striker bracket, said ball latch assembly operatively disposed on said rear member, said floor striker bracket fixedly mounted to the vehicle floor beneath said ball latch assembly such that when said seat tumble mechanism is in the generally horizontal position said ball latch assembly engages said floor striker bracket and holds said seat tumble mechanism in place.

19. A vehicle seat assembly as set forth in claim 18 wherein said ball latch assembly further includes at least one ball latch having a locating pin and at least one captured and spring

biased ball that protrudes laterally from the side of said locating pin to engage a latch opening in said striker bracket such that when said locating pin is set into said latch opening said ball is depressed as it passes through said latch opening and then re-extends to hold the seat tumble mechanism to said floor striker bracket.

20. A vehicle seat assembly as set forth in claim 19 wherein said seat tumble mechanism further includes a pair of said floor striker assemblies each operatively mounted on the underside of the ends of the rear member and joined by a release bar, said release bar operable to simultaneously release both said ball latches from said floor striker brackets.